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# On the suitability of fast and frugal heuristics for designing values clarification methods in patient decision aids: a critical analysis

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## Abstract

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**Background** Increasingly, patient decision aids and values clarification methods (VCMs) are being developed to support patients in making preference-sensitive health-care decisions. Many VCMs encourage extensive deliberation about options, without solid theoretical or empirical evidence showing that deliberation is advantageous. Research suggests that simple, fast and frugal heuristic decision strategies sometimes result in better judgments and decisions. Durand *et al.* have developed two fast and frugal heuristic-based VCMs.

**Objective** To critically analyse the suitability of the ‘take the best’ (TTB) and ‘tallying’ fast and frugal heuristics in the context of patient decision making.

**Strategy** Analysis of the structural similarities between the environments in which the TTB and tallying heuristics have been proven successful and the context of patient decision making and of the potential of these heuristic decision processes to support patient decision making.

**Conclusion** The specific nature of patient preference-sensitive decision making does not seem to resemble environments in which the TTB and tallying heuristics have proven successful. Encouraging patients to consider less rather than more relevant information potentially even deteriorates their values clarification process. Values clarification methods promoting the use of more intuitive decision strategies may sometimes be more effective. Nevertheless, we strongly recommend further theoretical thinking about the expected value of such heuristics and of other more intuitive decision strategies in this context, as well as empirical assessments of the mechanisms by which inducing such decision strategies may impact the quality and outcome of values clarification.

## Introduction

Strategies of care sometimes are equivalent from a standpoint of medical efficacy. Such so-called preference-sensitive screening or treatment decisions often are new to patients, entail complicated trade-offs (e.g. risk of a miscarriage vs. risk of giving birth to a disabled child in prenatal diagnosis), evoke strong emotions and may have significant, sometimes irreversible consequences.<sup>1–5</sup> When facing such decisions, patient preferences can be labile or non-existent<sup>6–8</sup> and need to be clarified. As available alternatives often cannot directly be compared on single quantifiable attributes (i.e. there is no ‘common currency’),<sup>3,4</sup> making treatment and screening decisions is challenging.

Increasingly, patient decision aids (PtDAs) are being developed to support patient decision making. Patient decision aids can enhance patients’ knowledge and their satisfaction with the decision-making process.<sup>9</sup> However, their effect on decision quality and decision process measures, such as feeling clear about one’s values, varies.<sup>10</sup> As Durand *et al.* and others have underlined, we lack insight into the nature of cognitive processes that might help patients make informed preference-sensitive decisions.<sup>11–15</sup> We underscore their and others’ call for stronger theoretical and conceptual underpinnings for designing PtDAs<sup>12,16,17,18</sup> Empirical tests of theoretically-based PtDAs will improve our understanding of how to design effective PtDAs.

## Mechanisms underlying current values clarification methods

So-called values clarification methods (VCMs) currently included in PtDAs largely encourage extensive deliberation: analytical, explicit reasoning processes, such as listing pros and cons and assigning decision weights (e.g. 1–5 stars) to them.<sup>19</sup> This reflects a central assumption in the literature that VCMs should encourage extensive deliberation.<sup>20,21</sup> However, human reasoning strongly depends on intuition.<sup>22–25</sup> Over the past 20 years, psychological evidence has accumulated, showing that intui-

tive decision strategies such as relying on emotional ‘gut feelings’, deciding after a brief period of distraction, or deciding based on mental shortcuts or heuristics sometimes result in better judgments and decisions (i.e. more in line with expert opinion, more accurate, or resulting in higher consumer satisfaction) than extensively considering all information.<sup>26–28</sup> It is as yet unclear to what extent these findings can be translated to patient decision making. Durand *et al.* provide a first test of the feasibility of VCMs based on ‘fast and frugal heuristics’. Thereby, they make an important contribution to the field of PtDAs. First, they designed ‘theoretically-informed’ VCMs.<sup>12,16</sup> Second, these VCMs are based on more intuitive decision strategies. Their study provides preliminary insight into how decision makers value such tools.<sup>11</sup> However, we see important pitfalls in translating fast and frugal heuristics to the context of PtDAs. Here, we aim to provide a critical analysis of the suitability of these simplifying heuristics in VCMs.

## Fast and frugal heuristics

Fast and frugal heuristics are decision strategies that (i) are simple: they exploit evolved or learned human capacities; (ii) are ecologically rational: they are not inherently good or bad, but they are accurate relative to the structure of the environment; and (iii) describe the way people make decisions naturally in those environments.<sup>26,28,29</sup>

Research has shown that using fast and frugal heuristics, and thereby *less* information and time, sometimes results in *more accurate* judgments (i.e. more in line with actual facts).<sup>28</sup> Two such heuristics are ‘take the best’ (TTB) and ‘tallying’. The TTB heuristic is member of the ‘one good reason’ family of heuristics. It implies ignoring cues and making inferences based on the first cue encountered which enables one to make the inference. Tallying is a strategy in which information elements are given equal weight in making predictions. Both types of heuristics have been found to be equally or more accurate in making judgments compared to

more complex decision strategies in various settings, including estimating which of two cities has a larger population, the number of car accidents on specific stretches of highways, and attractiveness ratings of public figures.<sup>30,31</sup>

### The suitability of fast and frugal heuristics in patient decision aids

Durand *et al.*<sup>11</sup> have designed a TTB and a tallying heuristic-based VCM for women facing the decision to undergo or not to undergo amniocentesis. We question the suitability of these heuristics in patient preference-sensitive decision making for two main reasons: (i) the qualitative difference between making inferences in familiar decisions vs. determining preference in new decisions by integrating information and (ii) decision environments in which information and time resources are limited vs. decision environments in which these are not at stake.

(i) *Making inferences vs. determining preference.* In the medical field, the use of simple heuristics rather than more complete information has been shown to be equally good or advantageous to physicians who had to choose a strategy of care.<sup>32–34</sup> In such cases, physicians need to assess the validity of information for making inferences about patients' condition. Also, an external criterion of success exists, which enables decision makers to determine the accuracy of their estimation. This context is similar to those in many of the studies demonstrating the success of fast and frugal heuristics, which involved decision makers who were familiar with the decision context and had experience or gained experience with the structure of the environment before making a particular decision.<sup>28</sup> Decision makers could therefore benefit from their experience regarding the appropriateness of information elements in making inferences and thus learn to use information efficiently. Evidence indeed suggests that experts tend to apply more selective information processing than non-experts.<sup>35</sup> Durand *et al.* suggest that compared to more complex interventions, fast and frugal heuristics may, in a similar way, lead to better decisions in patients as decision makers.

However, patients do not make objectively accurate or inaccurate inferences about some external object; they need to integrate and weigh pieces of information to determine their personal preference in new decision situations. Preference-sensitive options in health care carry benefits and risks. The central task in clarifying one's preference lies in making trade-offs between these. Patients need to consider to what extent pieces of information are important to them in their specific situation. They lack the experience with the decision that would have enabled them to know how well relying on specific pieces of information helps them to make a decision they will not regret later on. Also, there is no external criterion for the 'accuracy' of preferences, because good patient decisions in health care may lead to bad outcomes. For example, amniocentesis may result in a miscarriage, but was it then a bad decision? In other words, outcome of a specific decision does not teach decision makers about the rightness of their choice, as it would have if there was an external accuracy standard involved.

(ii) *Limited information and time resources.* In arguing in favour of the suitability of the TTB and tallying heuristics, Durand *et al.* refer to decision situations in which there is limited knowledge and time and in which these have proven successful.<sup>36–40</sup> The success of judgments based on less information is attributed to the 'bias-variance dilemma'. By using less information, the variance component in errors of predictions is reduced. However, when information acquisition costs are low, when there is no time pressure and when information is provided simultaneously, compensatory strategies, that is, strategies in which favourable values on some attribute can compensate for unfavourable values on other attributes, predict individuals' inferences<sup>41,42</sup> and preferences<sup>41</sup> better.

Generally, in decisions for which PtDAs are available, information search and potential costs associated with searching are not at stake, as the PtDA offers the relevant information. By definition, decision aids should provide all relevant information about the condition and options. So, patients who have access to PtDAs have access to

information, which they can use to evaluate how much they prefer one option over the other.

Also, in cases in which PtDAs are offered, there is often sufficient time available to consider one's preference regarding the options. In case of deciding about amniocentesis, women usually have 2–3 weeks to decide whether or not they wish to conduct the test – or even more, if we take into account that women may start considering amniocentesis from the moment they know they are pregnant. It is therefore questionable whether the level of time pressure is comparable to the level of time pressure which was present in the studies showing an advantage of fast and frugal strategies.

### Should fast and frugal heuristics be encouraged as decision processes?

We argued above that we have reason to expect that the structure of the patient decision-making context differs from the structure of environments in which the TTB and tallying heuristics have been shown to result in accurate judgments. We further expect that heuristic decision strategies are not accurate descriptions of patients' natural decision processes. Specifically, we expect that patients will rather use compensatory decision strategies because of patients' lack of expertise with the decision,<sup>35</sup> their personal involvement,<sup>43</sup> the relatively small number of options (e.g. undergoing or not undergoing amniocentesis) and attributes that distinguish the options (e.g. risk of miscarriage, gain in certainty about chromosomal problems),<sup>44–46</sup> and because the decision is made under uncertainty.<sup>47</sup> Yet, an appealing aspect of heuristic-based VCMs is their apparent simplicity in use. It is an empirical question whether TTB and/or tallying heuristic-based VCMs may be helpful in supporting patients in clarifying their values. Empirical evidence suggests that active processing of information, and of probabilistic information in particular, is useful in understanding information.<sup>48</sup> Therefore, heuristic tools may be helpful because they help patients to actively engage with the information, that is, to think about reasons to choose or not to choose an

option. This may support patients in determining the importance of information to their preference. An important issue here is the assumption that patient preferences will often at least partly be constructed when patients face a preference-sensitive decision. There is evidence showing that people apply either compensatory or non-compensatory decision strategies depending on the preference elicitation method<sup>49,50</sup> and that strategy use affects outcomes.<sup>50,51</sup> If patients are encouraged to consider *less* rather than *more* relevant information, it is questionable whether this will improve the values clarification process. It may even deteriorate that process by drawing attention to a single attribute that may be easiest to evaluate, but may not necessarily be the most important in determining preference.<sup>27</sup>

Of note, Durand *et al.* characterize their tools as 'intuitive'. Intuition serves as a broad umbrella term for highly diverse decision strategies, which share the feature of *not* being analytical. Some of these may be more suitable for VCMs than others. Heuristic-based tools as Durand *et al.* describe may be less complex in use than more conventional VCMs but still rely on considering attributes of options. They do not encourage holistic evaluations of options, such as relying on emotional 'gut feelings' or deciding after a brief period of distraction. Such intuitive preferences have been argued to be based on more comprehensive processes and to represent balanced, intuitive summary judgments of well-integrated information elements.<sup>3,4,23,24,26,52</sup> Future research could provide tests of the suitability of specific intuitive processes in VCMs.<sup>15</sup>

### Conclusion

Many VCMs encourage individuals who are considering preference-sensitive health-care options to deliberate extensively, without a solid theoretical and empirical basis for the assumption that deliberation is advantageous. The TTB and tallying heuristics are examples of more intuitive decision strategies that have been proven advantageous in decision tasks other than patient preference-sensitive decision making. The specific nature of patient values clarification does not



seem to resemble environments in which these heuristics have proven to do well. Moreover, encouraging patients to consider less rather than more relevant information potentially deteriorates their decision processes. Values clarification methods supporting patients to use more intuitive decision strategies may sometimes be more effective, but the evidence is still very limited. We strongly recommend further theoretical thinking about the expected value of fast and frugal heuristics and other intuitive decision strategies in this context as well as empirical assessments of the mechanisms by which inducing such decision strategies may impact the quality and outcome of values clarification.

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## Conflict of interest

None.

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